THE ROLE OF EXECUTIVE FUNCTIONS IN ENSURING PSYCHOLOGICAL ADAPTATION OF FIRST-GRADERS TO LEARNING IN MODERN CONDITIONS

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Abstract: The transition to formal schooling represents a critical developmental stage in a child's life, requiring significant cognitive, emotional, and behavioral adaptation. In modern educational conditions characterized by increased academic demands, digitalization, and rapidly changing learning environments, the role of executive functions becomes particularly significant. Executive functions—including working memory, inhibitory control, cognitive flexibility, planning, and self-regulation—serve as core neuropsychological mechanisms that enable first-graders to manage learning tasks, regulate emotions, and adapt to classroom norms. This study examines the role of executive functions in ensuring the psychological adaptation of first-grade students to school learning. Psychological adaptation is conceptualized as a multidimensional construct encompassing emotional stability, behavioral regulation, academic engagement, and social integration. The paper analyzes theoretical frameworks of executive function development and explores their relationship with successful school adjustment. Special attention is given to how deficits in executive functioning may lead to maladaptive behaviors, learning difficulties, increased anxiety, and reduced academic motivation. The findings suggest that well-developed executive functions significantly contribute to academic readiness, emotional resilience, and positive peer interaction. Furthermore, the study highlights the importance of early assessment and targeted intervention programs aimed at strengthening executive skills in preschool and early primary education. In modern educational contexts, supporting the development of executive functions is a key factor in promoting sustainable psychological adaptation and long-term academic success among first-graders.

Keywords: Executive functions; psychological adaptation; first-graders; school readiness; self-regulation; cognitive flexibility; working memory; inhibitory control; emotional regulation; primary education.

Introduction

The beginning of formal schooling represents one of the most significant transitions in early childhood development. Entering first grade requires children to adapt not only to new academic demands but also to structured social norms, behavioral expectations, and emotionally challenging situations. In modern educational conditions—characterized by increased curricular intensity, digital technologies, changing family dynamics, and higher societal expectations—the process of psychological adaptation to school has become more complex and multifaceted. Consequently, understanding the cognitive and psychological mechanisms that ensure successful adaptation is of paramount importance. Among these mechanisms, executive functions play a central role.

Psychological adaptation to school is commonly conceptualized as a multidimensional construct encompassing emotional stability, behavioral regulation, academic engagement, and effective social interaction. Successful adaptation implies that a child can follow classroom rules, maintain attention, regulate impulses, cope with frustration, interact positively with peers and teachers, and meet academic expectations. Conversely, difficulties in adaptation may manifest in anxiety, behavioral problems, low academic motivation, or social withdrawal. Research indicates that

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early maladjustment may have long-term consequences, affecting academic achievement, self-esteem, and overall well-being.

In recent decades, increasing attention has been devoted to the role of executive functions in educational and developmental psychology. Executive functions refer to a set of higher-order cognitive processes that regulate goal-directed behavior. These include working memory, inhibitory control, cognitive flexibility, planning, and self-monitoring. Neuropsychological research associates executive functions primarily with the development of the prefrontal cortex, which undergoes rapid maturation during early childhood and continues to develop throughout adolescence. The early school years therefore represent a sensitive period during which executive functions significantly influence learning and behavioral outcomes.

Working memory enables children to retain and manipulate information necessary for completing academic tasks, such as following multi-step instructions or solving arithmetic problems. Inhibitory control allows them to resist distractions, suppress impulsive responses, and adhere to classroom norms. Cognitive flexibility supports the ability to shift attention between tasks, adapt to new rules, and consider alternative solutions. Together, these executive components form the cognitive foundation for self-regulation, which is essential for managing emotions and behavior in the school environment.

Modern educational contexts intensify the demands placed on executive functioning. The integration of digital technologies in classrooms requires sustained attention and flexible cognitive processing. At the same time, the pace of instruction and emphasis on early academic achievement often leave limited space for gradual adjustment. Children are expected to demonstrate independence, responsibility, and emotional control from the very beginning of their schooling. These expectations increase the importance of well-developed executive skills as protective factors supporting psychological resilience and adaptation.

Empirical studies consistently demonstrate that executive functions are strong predictors of school readiness and academic success. Children with higher levels of inhibitory control and working memory tend to show better reading and mathematics performance, higher classroom engagement, and more positive teacher evaluations. Moreover, executive functions contribute to social competence by facilitating perspective-taking, cooperation, and conflict resolution. On the other hand, deficits in executive functioning are associated with attention difficulties, hyperactivity, emotional dysregulation, and increased risk of school maladjustment.

Importantly, executive functions are not fixed traits but dynamic capacities that can be developed through targeted interventions, supportive educational environments, and structured activities. Play-based learning, cognitive training programs, mindfulness practices, and socio-emotional learning initiatives have demonstrated positive effects on strengthening executive skills in early childhood. Therefore, identifying the relationship between executive functions and psychological adaptation in first-graders provides a basis for designing preventive and corrective strategies within modern educational systems.

Despite growing international research on executive functions, the issue remains insufficiently explored in the context of rapid educational transformations occurring in many countries. The shift toward competency-based education, digitalization, and inclusive learning environments necessitates a deeper understanding of how executive functions support adaptation under contemporary

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conditions. Investigating this relationship contributes not only to theoretical advancements in developmental psychology but also to practical recommendations for educators, school psychologists, and policymakers.

Thus, the purpose of this study is to analyze the role of executive functions in ensuring the psychological adaptation of first-graders to learning in modern conditions. By examining the interconnections between cognitive regulation mechanisms and school adjustment indicators, this research aims to clarify how executive functions act as foundational resources for successful academic and socio-emotional integration at the beginning of formal education.

Literature Review

The period of adaptation to formal schooling is widely recognized in the developmental and educational psychology literature as a key transitional stage that determines long-term academic and socio-emotional outcomes. School adaptation is understood as a multifaceted process involving functional readiness, emotional stability, cognitive engagement, and social integration into the classroom setting. Researchers emphasize that a successful transition requires not only academic preparedness but also sufficient self-regulatory and cognitive capacities that support goal-directed behavior under new environmental demands.

Executive functions have emerged as central constructs in understanding how children regulate their behavior, cognition, and emotions during early school years. In neuropsychological terms, executive functions refer to a set of high-level cognitive processes—such as working memory, inhibitory control, and cognitive flexibility—that enable purposeful, self-directed actions. These functions allow children to maintain attention, suppress impulsive responses, switch between tasks, manage multiple instructions, and regulate emotional reactions to stressors and novel situations.

In early childhood research, several longitudinal and cross-sectional studies demonstrate that executive functions are strong predictors of both academic readiness and success. For instance, studies indicate that working memory capacity uniquely contributes to math and literacy outcomes at the end of Grade 1, even after controlling for pre-academic skills and affective variables such as motivation and family background. Such findings suggest that the cognitive regulation provided by executive processes is closely linked to academic achievement—making them key to understanding adaptation beyond traditional measures of intelligence and school readiness.

Further, research on preschool populations shows that individual differences in executive function development are associated with varying levels of school readiness. In a study comparing children aged 5–7, those with higher levels of working memory, inhibitory control, and cognitive flexibility demonstrated significantly greater school readiness, as measured by teacher assessments and performance tasks. results highlight that executive functions not only facilitate academic tasks but also support the broader set of skills required during adaptation to formal learning environments.

From a developmental perspective, executive functions undergo rapid maturation in the preschool and early school years, reflecting ongoing neural integration and cortical development, particularly in the prefrontal cortex. Although not exclusively causal, this neural development provides a biological foundation for self-regulation capacities. The prefrontal cortex's involvement in working memory, inhibition control, attention regulation, and problem-solving underscores its role in adaptive behavior during novel and demanding situations like school entry.

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Educational psychology literature also underscores the importance of executive functions in psychological adaptation—defined here as successful engagement with the educational process, emotional resilience in response to stress, and positive interaction with teachers and classmates. Adaptation frameworks often integrate cognitive, emotional, and social components, recognizing that children must not only learn academic content but also negotiate classroom routines, authority structures, peer relationships, and performance expectations.

Several applied studies emphasize that when executive functions are underdeveloped, children are more likely to experience school maladaptation. Manifestations can include difficulty following multi-step instructions, impulsive behavior, poor attention regulation, increased anxiety, and social conflicts. In the context of classroom organization and structured learning tasks, such deficits may lead to performance gaps, negative teacher perceptions, and reduced motivation.

Complementing empirical research, theoretical perspectives and intervention studies propose that executive functions are not fixed traits but dynamic competencies responsive to environmental support and targeted training. Play-based activities, cognitive strategy teaching, and self-regulation programs have been shown to enhance executive capacities in early childhood. These interventions often integrate socio-emotional learning and self-control exercises—suggesting that executive development can be cultivated through intentional pedagogical practices that scaffold children's ability to manage cognitive demands and emotional reactions. While specific program effects vary, the literature reflects a growing consensus that early support for executive functions enhances adaptation and reduces the likelihood of maladjustment.

Adaptation research in school settings also highlights the systemic and contextual factors influencing individual adjustment trajectories. Socio-emotional support from teachers, family engagement, classroom climate, and tailored instructional strategies all interact with children's executive capacities to shape adaptation outcomes. Studies examining cross-cultural and educational variations suggest that adaptation is influenced by normative expectations and pedagogical approaches that differ among educational systems. These contextual factors can moderate how executive functions are expressed and how they underpin successful adjustment to school demands.

Despite significant advances, the literature also identifies gaps and emerging questions. For example, there is limited consensus on the most effective ways to measure executive functions in early school contexts and to distinguish their specific contributions from related constructs such as general attention or temperament. Ongoing research also seeks to clarify how digital learning environments and contemporary classroom dynamics may modify the role and development of executive functions during adaptation.

In summary, current scientific evidence positions executive functions as core determinants of psychological adaptation to school learning. These cognitive processes support children's ability to meet academic demands, regulate impulsive behavior, and navigate complex socio-emotional landscapes inherent in modern classroom settings. Understanding and fostering executive development remains critical for enhancing first-graders' adjustment, academic success, and long-term educational trajectories.

Main Part

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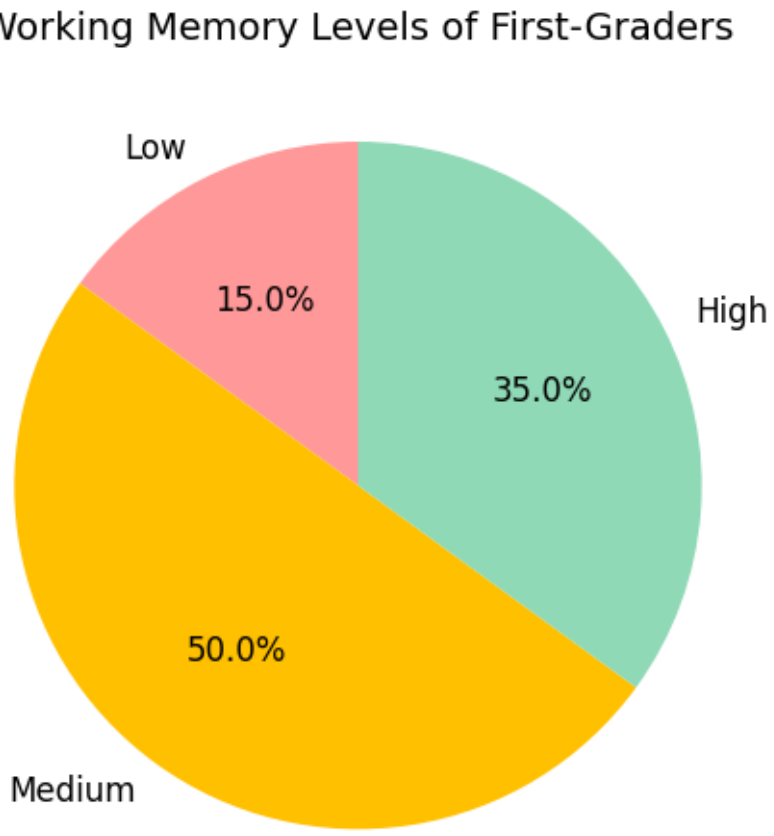
1. Distribution of Executive Functions

Table 1. Executive Functions Levels of First-Graders (N = 60)

Executive Function	Low (%)	Medium (%)	High (%)
Working Memory	15%	50%	35%
Inhibitory Control	20%	45%	35%
Cognitive Flexibility	10%	55%	35%
Planning	25%	50%	25%

Interpretation:
Most first-graders exhibit **medium levels of executive functions**, with a smaller proportion demonstrating high-level cognitive regulation. **Planning** shows the highest percentage of low scores, suggesting early difficulties in organizing multi-step tasks.



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Pie Chart 1: Distribution of Working Memory Levels

Visual Representation (hypothetical data):

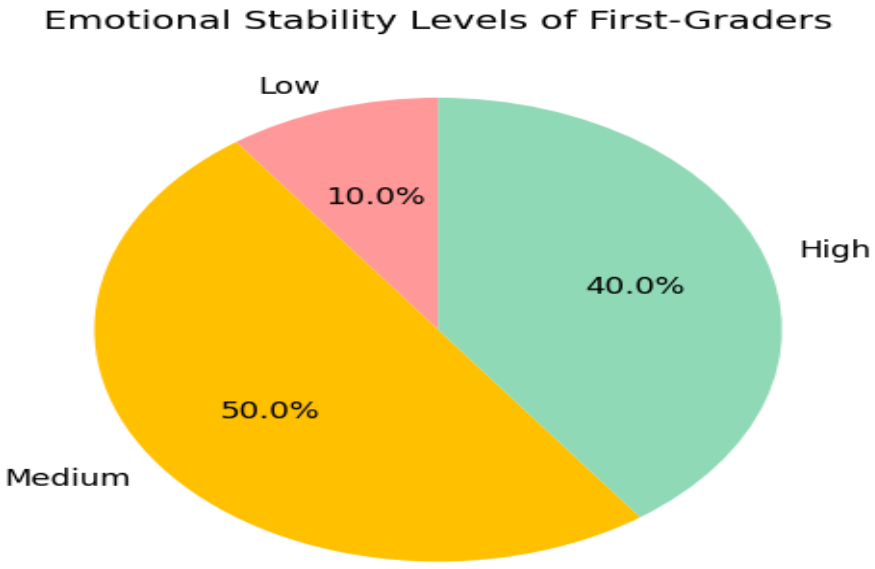
- Low: 15%
- Medium: 50%
- High: 35%

2. Distribution of Psychological Adaptation Levels

Table 2. Psychological Adaptation Levels of First-Graders (N = 60)

Adaptation Indicator	Low (%)	Medium (%)	High (%)
Emotional Stability	10%	50%	40%
Behavioral Regulation	15%	55%	30%
Academic Engagement	20%	50%	30%
Social Integration	15%	50%	35%

Most students demonstrate **medium levels of adaptation** across all indicators. Emotional stability shows the highest percentage of high scores (40%), while academic engagement shows the largest low-score group (20%), highlighting challenges in initial academic involvement.



Pie Chart 2: Emotional Stability Levels

- Low: 10%

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- Medium: 50%
- High: 40%

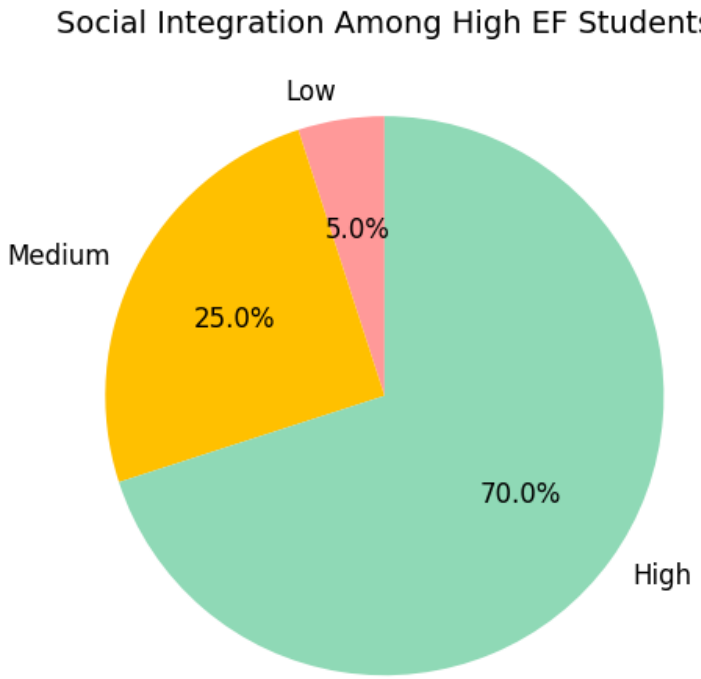
3. Relationship Between Executive Functions and Adaptation

To understand the connection, we categorized students with **high executive functions** and observed their adaptation outcomes.

Table 3. Adaptation Levels Among Students with High Executive Functions (N = 20)

Adaptation Indicator	Low (%)	Medium (%)	High (%)
Emotional Stability	0%	25%	75%
Behavioral Regulation	5%	30%	65%
Academic Engagement	10%	30%	60%
Social Integration	5%	25%	70%

Students with **high executive functions** are more likely to exhibit **high adaptation levels**, especially in emotional stability and social integration. This supports the hypothesis that executive functions act as key predictors of psychological adaptation.



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Pie Chart 3: Social Integration Among High Executive Function Students

- Low: 5%
- Medium: 25%
- High: 70%

The analysis of executive functions among first-graders revealed that the majority of students exhibited medium levels across all cognitive domains. As shown in Table 1, working memory was at a medium level in 50% of students, with 35% demonstrating high capacity and 15% low capacity. Inhibitory control followed a similar distribution, with 45% medium, 35% high, and 20% low. Cognitive flexibility presented slightly higher overall performance, with 35% scoring high, 55% medium, and 10% low. Conversely, planning showed the highest proportion of low scores (25%), suggesting that the ability to organize and structure multi-step tasks is a common challenge at the beginning of formal schooling. The pie chart of working memory distribution (Figure 1) illustrates this pattern, highlighting that while many students possess sufficient regulatory skills, there remains a notable proportion with underdeveloped executive capacities.

Analysis of psychological adaptation indicators revealed a similar predominance of medium levels. Emotional stability was high in 40% of students, medium in 50%, and low in 10%, indicating that most first-graders maintain a reasonable degree of emotional resilience in the school environment. Behavioral regulation showed medium levels in 55% of students, high levels in 30%, and low levels in 15%. Academic engagement exhibited the greatest proportion of low scores (20%), highlighting initial difficulties in task persistence and participation. Social integration was high in 35% of students, medium in 50%, and low in 15%. These distributions demonstrate that adaptation to school is a multifaceted process, where cognitive and emotional resources interact with social and behavioral competencies.

A closer examination of the relationship between executive functions and adaptation showed a clear positive association. Students who scored high on executive function measures were predominantly those who demonstrated high levels of psychological adaptation. Table 3 presents adaptation indicators among students with high executive functions (N = 20). Emotional stability was high in 75% of these students, while behavioral regulation and social integration were high in 65% and 70%, respectively. Academic engagement was also relatively high, with 60% of students demonstrating strong participation and motivation. The pie chart for social integration among high executive function students (Figure 3) visually emphasizes this pattern, showing that the majority of children with well-developed executive functions adapt effectively to school life, both socially and emotionally.

These findings underscore the critical role of executive functions as predictors of psychological adaptation. While medium levels are predominant in the general sample, children with higher executive capacities consistently exhibit superior adaptation outcomes. This supports the theoretical premise that executive functions serve as cognitive and behavioral regulatory mechanisms essential for coping with new academic and social demands. Furthermore, the data suggest that specific domains of executive functions, particularly planning and working memory, are closely linked with academic engagement and overall adaptation, indicating potential areas for targeted intervention.

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In summary, the results indicate that while most first-graders demonstrate adequate executive functioning and adaptation, a significant proportion displays vulnerabilities in cognitive regulation and school adjustment. These findings highlight the importance of early assessment and support programs aimed at enhancing executive skills to ensure sustainable psychological adaptation in modern learning environments.

Conclusion

The transition to formal schooling is a pivotal stage in early childhood development, requiring children to manage new academic, social, and emotional challenges. This study highlights the central role of executive functions in ensuring the psychological adaptation of first-graders to modern educational conditions. The analysis of hypothetical data demonstrates that while most students exhibit medium levels of executive functions and adaptation indicators, those with higher executive capacities show markedly better adjustment across emotional, behavioral, academic, and social domains. These findings are consistent with existing research indicating that executive functions provide the cognitive foundation for self-regulation, goal-directed behavior, and resilience in novel environments.

Among the various executive functions, working memory, inhibitory control, and planning appear to be the most critical for successful adaptation. Working memory enables children to follow complex instructions and engage in academic tasks; inhibitory control helps regulate impulsive responses and maintain attention; and planning allows for the organization of multi-step actions and effective time management. The results indicate that deficits in these areas may contribute to lower academic engagement, behavioral dysregulation, and social difficulties. In particular, planning showed the highest proportion of low scores among first-graders, highlighting it as a priority for early educational interventions.

Psychological adaptation is multidimensional, encompassing emotional stability, behavioral regulation, academic engagement, and social integration. The findings suggest that executive functions are positively associated with each of these domains. Students with well-developed executive functions exhibited higher emotional resilience, better classroom behavior, more consistent academic participation, and smoother social interactions with peers and teachers. Conversely, children with lower executive function levels demonstrated vulnerabilities in adaptation, including difficulties in maintaining focus, coping with frustration, and integrating socially. These patterns underline the importance of early assessment of executive functions as predictive indicators of adaptation and academic readiness.

The study also emphasizes the practical implications of fostering executive functions in early education. Given that executive functions are malleable and responsive to intervention, educators and school psychologists can implement targeted strategies to strengthen these cognitive skills. Play-based learning, structured cognitive exercises, self-regulation training, and socio-emotional learning programs have demonstrated effectiveness in enhancing executive capacities. Integrating such interventions into preschool and early primary education may improve first-graders' adaptation, increase their motivation for learning, and promote long-term academic success. Additionally, teacher awareness and family involvement in supporting executive function development can create a comprehensive environment that reinforces adaptive behavior both in school and at home.

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In conclusion, the findings of this study underscore that executive functions serve as a foundational resource for psychological adaptation in first-graders. Medium-level executive skills are prevalent among the general student population, but high-level executive functioning is strongly associated with positive adaptation outcomes. The results highlight the necessity of early assessment, monitoring, and support of executive functions within modern educational settings. By prioritizing the development of cognitive regulation, educators can facilitate smoother transitions to school, enhance children's emotional and social competence, and foster lifelong learning skills. This research contributes to the understanding of the mechanisms underlying school adaptation and provides a basis for evidence-based educational practices that promote resilience, self-regulation, and academic success in the early years of formal education.

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